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## CONTENTS FOR MAY, 1944

Felome G . Namier i Oneding for May Edwarial: The Critics Street Related Note . . . "Peckaged" Airports I for Bandy's Air Force George & Ray 122

Avioline Menutostaring Strolge Analysis No. 4. The deficed land Mangada: Chemic S. Richer. 127 Steere & Maller 141

From Biller To Whole Graphic Neu-Affragions in Computing Tree Abspect School G. Smalt 154

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"Pendunyan" Should be Transferbaness Toy. At Auto S. Maller, 45. 18"

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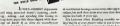


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ATTATION, May, 1844



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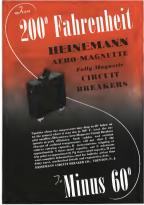
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Then he said to himself

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Tilk once Premier Messelini was right when, just a year is, he wared the Facial Directode that "This war still helds unperdictable developments, which will not all be on the political plane." But there was enough on the "painting lyous" to sizes the stin

book is his color, and if one wishes to read a moral into his statement, is could well be:
You obvoys lead with your chin when you feem up with the wrong working poster.
It is then you get unpredictable

## "Unpredictable Developments" he says

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Sound dough and coreful workmanking give South Bred Lather the dependable precision that assures uniform accounty. But by skilled confumes who take price in their work, they not capable of materialsing sold observable tolerances on all week within their

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opuls, Their menying preferences speels good distinct in the new content genelows permission and manures perfect intendenquishing of parts and unatural productions. These Latine for most way production requirements. The Egyler Latine are made in NY, 197, 197, 197, 407, 407 for rings, with the lengths from \$7 to 107. The Toulessen Latine are made in NY, 197, 197, and 197 was given which be lengths for 87 to 15. The Toures Latine are made in NY and 197 was given the latine are made in NY and 197 was given the Latine State of Latine State of the Latine State of the Latine State of Latine State of the Latine State of t

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OWES ITS OWN ABILITY TO FLY W/ITHOUT special allow steels.

HAND BOOK OF SPECIAL STEELS

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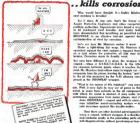
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Under a fight litter for your, Mr. Moisture in equation against the steel surface - tropped these on a sunt select the acategins oil this more has hosiers. Corrector starts to deadly wash. But note how different it is when the womper in creped-when & STRETCHES is the lette tir channels between possis where it teaches the steet, Mr. Maintare foods athore many to words out presed in the DIDUWRAP weapper.

metal, or come from salreats in the all correspond with which the moved in abushed, it may make the unwelcome oppositance from many places, and if does, DIDUWRAP - crewed and with its corestion inhibites matel-conjusting authors - to note insurere anniest this toyable maker

using a creped, resilient wayppen. It is flexible and conforms peoply to the protrading parts of old-shaped articles, without manufacture or boar.





ATLATION, May, 1944

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#### Designed for the Production Line

CP Beavered Shorter Thicks are built to Cake. 2" - with nowerful, high scoper toyable-free vanture, "Strength Lone Audiow" ventilation. makes the motors perhealedy cool rencent Heat treated believe greats and bell bearings. Samueland make CP Universal Shorter Tools their deergs is calculated to meet long continsous service - trair production has tools

The shift (Destroyed in the CP No. 806 "Mislaws"

In addition in Della, CP Shiverest Standay Tools Drover, Het Ronners Granture, Sandore Ruttere



















PHILIPATIC SEGLE

Septim. Deberrett

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enstoner friends are our paramount responsibility.

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In colorative tests, this bouter has started and operated anishmostly in temperatures as low as self-10, and at the content temperature and temperatures of 100000 ft. Streets.

ratios, sir euros and index sir neespectatures

la amiliating uses, particularly, thus burner tolerance
is important, water un areas installations it elizaientes
need for a combustion sir regulator valve which would be

As shown in the soccurposping chart, best curpor annually varies with present of the two or supply. Lightmight compile are evalidely which present constant ourless in recommence over a wide many of or five roots.



### This above phononing reduction of heart company to conduction are presented only the market prompt conduction had so had the addresses and the benefit to a public results of asserting conditions.









## MESH THE HEMISPHERES

With the would's remotest village but than were many States before the six-Erer mace World War L leeding sixused Wolf's Heed Oil for their central

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### LOST ... and found

For many on Air Transport Command Flyer moments in which "Spicks" can radio bis position to a process ship. · Ferrying signlanes, as well as fighting

a. But what, healths radio, makes alreredt radio interconscessionian possible? The The role of the Titetles ignition harness to this week is provereally known. It is perhape not quite as universally known that

Titefex Radio Strelded Igaition Harnesses are standard evaluation at the associate of Acceptant was planes. This may very well be attributed to Titedex visid standards of deand more research. . When the "opporplanes" will write the the engagement planes that will write the first chanters or the neare. Titefles hones

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That is why tree operation of device could be head.

But here it to: The Leur Assurier.

In job is operating flaps, heading gues, shotters and other equipment on the power of an alrelates recognition.

Note, of covere, one plants are working reased the clock to make soweph of these for the fighting ships of Units from. But we have that well marges forcing the soldier matters that drives these and of the 200 Long products, much have an inequipment frame in court generating products.

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### DATA ON PHOTOGRAPH

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ATTATION, May, 1944

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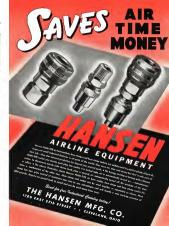
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Jornates Outerm







Poor man's power plant

Tex Jacobs ragine was designed and half primerly for the weeking pilos whose place win habitations, whose over procures were in service and missenance departments. The regime was read is not almphe, ragged, fell-free and

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or combot necross. And despites makes the solid property of the combot o

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in produce and arrived as the professional arrived as a well as performance? . . . . Impaires
are sovered. Lecolo Arrestol Engine Co.





# Motor-bike built for two



Here's an excellent answer to the need of airports for highly-mobile freentingualing enjoyment. Manned by advantage of the most of the prokide earlier disside extinguishers, this nettoreyels "east road" on each right up to each fires and other blazes and small them our quickly under a blanker of earlier droide gas. Klidde extinguishers are being.

make their fast fre-killing effect fully available to air fields. They're carried on large enargency tracks, two-wheeled trakers, jorge—even on "scooters."

If you have a fire protection problem—in the air or on the ground—the wide experience of Walter Kirkle & Company in this field will be helpful at finding the hest solution. Justifero us a live!



WALTER RIDDE & COMPARY, INC., SIR MAIN STREET, BELLEVILLE, R. J. ATTATION Nov. 1944



### Demands Dependable Carburetion

On the Lonestorn, Monghiles, and other handsom of the Brest this Person than him when the Grossay he paids are sent to the Fight STROMBERG\*

STROMBERG

RENDLY PRODUCTS DIVISIO





# INVASION and the FINAL CHALLENGE

The idea that our national security some disponding mound depend upon the successful invasion of continental Europe by our armed foeces was inconcer able to the average American but a few short years ago. Yet, today our whole strength is assembled to that very action and for assuming a sound and permanent poace.

America became great without aggression , without tyransy. Our greatness has been achieved without destroying others ... ours is a history of unprecedented industrial progress, of development of our own resources and reliance on our own effects.

Aggression is focusing to a fur own circum philosophy. Yet, today we find cuncleves faced with the choice of destroying or being do stroyed. Today, we are confriented by the hard fact that the kind of peace which we all an forewith destine can be achieved only by crossing autocase, and by removing the circums of autrestion.

the causes of aggression.

We are now engaged in the accomplishment of the first objective. Since Pead Harbor a complacent, peace-losing America—the largest of the "soft" and "decadent" democracies—has grown strong and tough. Out of the mhorent virifits of

a free people we have moulded the mightiest force for invasion and attack that the world has ever seen.

production. We see producing as much war equipment as all the rest of the world combined.

Bistory will record our industrial me-

History will record our industrial mobilization as a phenomenal achievement. The battle of production has been won! The full might of our armed forces and those of our allies unlevaked assignst the

The full might of our armed forces and those of our allies unleashed against the Axis war machine will bring eventual victory. Two and a half years of intensive perparation, backed by 168 years of growth as a free nation, has given us superiority over twenty years of paintstaking prepartion by the totaltarians and militaristic countries with their enshaved peoples.

Every American has contributed towards this powerful offensive. Our manufacturers and bussess leaders have earlied their follest efforts. Our ministries have neoblized their tremendous resources—tapped to the fullest degree their inventive and productive genius. The near near women in the factories, on the farms, and is the milk and mines have played a magnificent part in the tremendous production progum Catacus all are making their contribution to the armed victory that hes ahead.

We have demonstrated that a free peo-

ple under a free enterprise economy can unite in a common purpose.

When the war is won, we shall be faced

When the war is won, we stall be fared by our second objective... removing the causes of aggression. This is a social challenge. A challenge to those who would sacrifice our democratic way of life for personal gams or foreign idealogies.

of our democracy is a successful denoce racy. That means a dynamic and sot a static democracy. All of us who want to preserve the shoils that have made Amerca... and that isolades all but a handful of extremats... must determine to find the policies and pengamis which will premit us to make the most of the abundance matter has more sold for us.

To achieve this end we must recognize the fact that we are but a wheel in the muchinery of world exempt. A wheel that must drive or be driven. A wheel that must mesh smoothly with the many other wheels or be stropped of its rogs. We are the order nation or not the

enough and strong enough to shape the mould of its own destmy. We can be humpered by nothing but our own confusion. The mind and the heart of all America today brood over the shores of Britain and watch over the aurow waters that wash the beaches of the Continent. And the peayers of all America go with each of

those who embate upon that epic passage.

Those of us at home who are producing the figliang total and who are so cameraby concerned with the problems that wall face a posture America, thould see more, even if we may never have seen it before, that all our plans will be worth just exactly what the men and women who make that passage are prepared, competent, and in sport by their leadership to make them.

For those men and womens are Americal They have gone out from rich homes and poor heeses able, from farms and factories, from schools and chorches, from mines and ranches, from offices and studios, to take their places in the battle line. They are a cross-section of the America that is to be.

Whoever may draw the plans for that Assence, it is those men and women who will make the plans good. Invasion is their first step toward that end. May their work be speedly done, and may our plans be worthy of that work.

Shee H. W. haw. fr.

President VisCon Hill Publishing Constant, Inc.

## THE CRITICS STAND REFUTED

### And Sound Engineering Will Keep Them That Way

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Yoslie E. Varlle

### HERE ARE YOUR MARKETS

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By JOHN FOSTER, Jr., Associate Seller, "Associate

Presenting a comprehensive state-by-state and recipe-by-region press, the first ever exhibited for the eviction industry, analysis ing date for the determination of a mand distribution extensis

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AVIATION, Nov. 1986

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### NOW . . . "PACKAGED" AIRPORTS

By J. L. deCUBAS, Municipless Shotis Advantaged Co.

Everything from beacons and generators to terminal buildingster tropic, temperate, or arctic service-is insteded in Westinghouse international's new assissment units . . . Almost infelte number of combinations, to erect any type airport, can be supplied -and shipped by air if desired

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A BALLOT FOR THE FLYING BOAT

A Gage at Global Air Transpart Economics



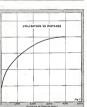
By GAPT, G. H. SCHILDHAUER, USHE

Compering speed fast-corps ratios, tea-mile figures, terminal costs, majetanesco, and other factors. The outber contents that the firing heat heasts advantages over the land plane in the con-

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## Table In-Characteraties and Performance





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Creard Aerolyments & Hydrodynomic

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ATTATION, May, 1944

### Keying Market Research To the Aircraft Industry

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By E. E. LOTHROP, Manager, Assembl & Statutant Dept.

Outlining the alops necessary for planning adequate long-range merchandising, the author points to the need for a comprehensive program triety aimed at three major extints.

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To meet the need of sircreft engineers for an anti-friction bearing - lighter in weight - of compact during - with maximum radial and throug food carrying conneity - Timbers corporers have developed a new series of supered roller bearings. Already, these bearings have contributed to the fine performance of Sikorsky beliepeters . . . while giving them all the other advantages of Tirelen Bearing

truth my Treebre Beerings in the Main Know Blade, tree on the Tall Rotte Gair Box, and has in the urbests.

design for aircraft applications; assured amorthment of operation . . . eve of handling . . . power conserva-Consult as on your requirements. We will be glad THE TIMEUN SOLLER SEARING COMPANY, CANTON 6, ORBO

TAPERED ROLLER BEARINGS



DESIGN ANALYSIS NO. 6

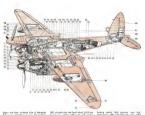
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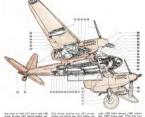
By CHESTER S. BICKER, Color Stdg. "Assess" Continuos Avintino's experienciar paries, delignificant's famous allowed fabler-bander is tern down to design and construction fradementals, revealing assured thought and execution . . . First of

The steen of Sw Gooffrey delitanttrappledes. Nother are the details of Botto's Air Minister in Sea. 1999. deffavilland experience in wooden six- force strongth without barther strain countries, a full seguitors housed

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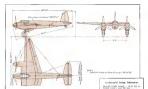
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AVEATION, May, 1946

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AVIATION: Way, 1944



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Souther Minnesh Assesses shell where carries

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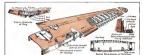
Boodier is sucther one of the vital every other one by flexible metalke tape. This is usually glass to wood numbers believe they are painted











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DATE OF STREET

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(Nyiding there anales into profitme requested to the 3 EuO 5-lo. ash torolon members at the lower edge of rack

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the the tech lay dears, with flesh wing and ah No 16. There was no of the antews that elegatithe vita stiffen.

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### METHODS FOR DETERMINING AIRFOIL PRESSURE DISTRIBUTION

By MOHROE A. MALLER, Hales Assett Co Specially collected for those who may be called upon to apply

speciary consider for these was may be content upon in appry experimental data obtained from tents, here are the practical steps required in artimeting eleful pressure forces. Particularly treated are mechanics, fort equipment, and wind tunnel models.

entioning to refer to the value of unfaturied total bend in the test section as love agrees total bend, and it assumed conveniently that the value of total bend is consumed in a phose agreemal to the unfactabled flow One important, property NI prignary in that it posteries is appeared as another or all directions. This further assumed principle is

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AVIATION Mr. 1944



Fig. 1. Personnent and surface classed data Solid wind bound.



Fig 2 Details of small-clard two-discontinual perior, with indiventional pressure artifices



Po. 3. Test energeness in MACA SA: restinal word forest (MACA photo )

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Fig. 6. Schole of until shoot has dissentional possil. (Cornels)

ATTATION, May, 1944

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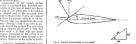
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Composed extrines used as flows as the composed training of th

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Fig. 5. Fundinamient but parel of 'Appl-







\*\* Comparison Astronomical Extractory, Cal. Fig. 2: Expend Series and Series and Technology

ATTATION, May, 1946

Two-dimensional Medals The noted preserve distribution of or



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Fig. 18. Development of a shift.



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#### FROM BILLET TO BLADE

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Englishes promets became forces from Justing into stock. AVEATION No. 1944

#### Approach to the Problem Of Radio Precipitation Static

PART IS NOTE PERSONS

By C. J. BRITTWINSER Stongs Shell Engineer, Constituted Value Abstract Corp.

Concluding his two-part series as this troublesome phasespages, the nother discusses present methods of unise reduction and the probable first salating to increwe radio engeneralizations.

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Minimization of Charactes Bate First and most drawn method of mini-

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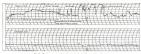
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stock has



AVEATION, May, 27th



#### Fig. 7. Struktowess recenting of ratio have autoid on a receiver using a connational single-view estates and a receiver with shirtful long frameway hand

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treatment on picked up by the rycriver as shown in Fig. 6.

The F-M receiver has a so-salled "eligper" stage which removes the effects of sky versions in amplitude and, cannoquestly, the mounted "avoidagence" in demandated and reproduced in the leedspeaker with prestructive on discrep-

specials with presciously no distortion.

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> One of the finding factors of persons day F-M systems in the due that it is a wale-hard system and formion, more sarry is confined to the short more legisle where these with channels as a nonlable. Nevertheless, F-M is recogniwity more had some netteral radio apple values on a green improvement one

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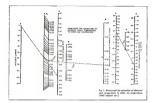
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#### Graphic Simplifications In Computing True Airspeed

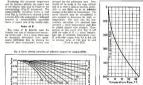
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By RICHARD & SHITH ANNUAL PARKET

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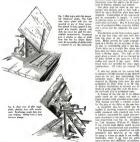
DOTERMINETER OF THE REGISE ADMIT OF THE BENGTY BATTE 111 from equally cost of the missably



AVIATION, Man. 1866

#### Precision Angle Plates "Bypass" Trigonometry

Obviotive use of moth for leving out company assist, dial angle plates amployed by Cartiss-Wright save many bears



THE PROCESS of larger out and shockan environment (Pigs. II and II) designed by Harry B. Cambort and Charles F. Pales forceson in Certas-Wright's tool suppotion department. The sinte-actually a remier stale. This loss, manuscroulde

The place may be under in any con-respect size desired, and to date both a 18x12 in, and a 20x14 to state base here and its accessories in tangle. A series of photing bairs are drilled in a 4 or 8

loss. Boles prevate for made measure-

point on the arc, thus determining that particular angle. Manufes of angle are applied in checking compound negles not saudy measured soft exactly and here.



# Lightweight Rubber Fuel Cell

INCREASES SAFETY REDUCES MAINTENANCE

Wittin self-nealing rabber feel print surpose was to proceed had another important advantage

ample, in minor crashes, these which could backle and split open

This discovery suggested the use of righter field cally as a soleneo to the fachlesks or nuclidous in

non-combatant surcess. It waste's necessary to carry other advantages of rubber commocra. The lightneed for a fearble, leak-proof, non-self-sealing

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are simply calked off sections of the wings with con-Thus, she thin of the wing is actually the craticle of responses to the property of the state of th

not weaken wings structurally, it can result in one-

When this occurs, much needed fact as loss in schedules disrupted. And repair costs are high be-

B. F. Goodrich "bladden ovor" cells exert these purhlying and offer other administrate. They can be made to many oper and thoper. Being featble, they'er early lourdled and removed No calking is necessary, thus saving an expensive building operation. Since each supplace requires a custom-built prodon each new installation. The B. F. Goodrich Common, Aeronautical Division, Alaron, Ohin.



THESE SKETCHES SHOW YOU WHY

BLADDER-TYPE FUEL **CELLS ARE** BETTER





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In was or peace B.E.Goodrich

FIRST IN RUBBER

MAKERS OF B. F. GOODRICH TIRES AND OVER SO BURBS AND SYNTHETIC RUBBER PRODUCTS FOR AIRPLANES

## 10 Good Reasons why you should Blind-Fasten with RIVNUTS

#### Here's a combination of advantages no other blind fastener can match

- . Dual use-can serve as blind rives or our place or both
- · Simple, one-piece construction
  - . Urangally wode bearing surface · Requires very small hole

  - · Speed of insultation

  - . Wide range of types and sizes · Available with key to increase











mon. First as her pennils may and mounts officianal, (Guston Wright plack) which would be the over with standard. This ends of the last age charaftered rine hert where thickness is taken into approximately 45 day. Ear is always consciousline. Since at position or the most is neglection with some time more

5 900 in. and 10 900 in., respectively.

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Construction is simple. A cylindrical wave tar, I by 6 in, phone on a target per at the apper left-hand corner of a are bolt ploced through the sone bar. This bolt has a flat efficient bend which

Fig. 6. The compound angle plate equably down on the bing states, incorporate company's angle determined about in Fig. 8 Adaptible planed under on und to ables End class edicatoral







A same or on the tool lever re-

Attaching accessory is easy

SIMPLE FAST FOOLPROOFI

fresh against, and at right angles to, the week

ATEATION, May, 1944

#### ANALYTIC GEOMETRY FOR SPEEDIER WING LOFTING

By R. W. FEINY, Left Serious Section Aspet, St. Matheds for obtaining recey vital directaions of control structural

wise members are described in this fixed part of our series as

craplified wing development by use of analytic geometry.



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tre of interaction. The tree angle

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Tree Angles Schwarz Rance

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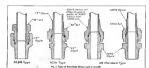
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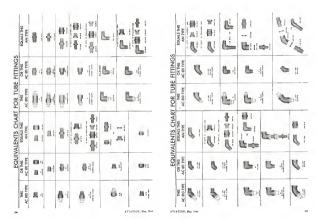
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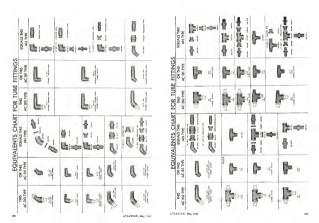
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Tabo Pittings. P. 166 to 177 Hotel Pittings. P. 176 to 169 Pipe Pittings. P. 161 to 164



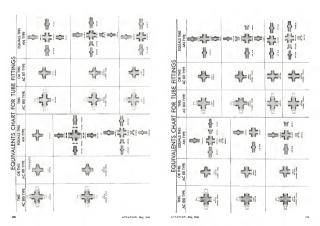




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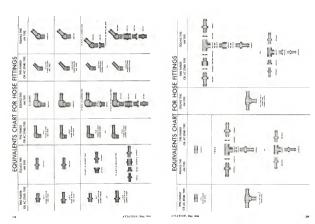
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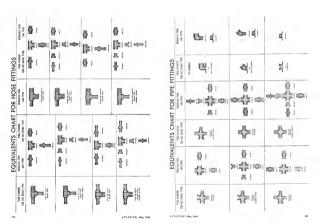


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ATLATION, May, 1944

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#### LOOKING AHEAD TO AIR CARGO MARKETS FART IS

By ROBERT K. KINZEL

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#### By John S. Miller, na Dr., do Corpo

Fighter pilets share on importest responsibility with their crew shiefs in heaping aircraft in operation against the occupy. Here are seem important tips for each heftlefrost pilets—tips which will serve them and their agendress well.

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#### REPUBLIC AVIATION

Specialists in High-speed, High-althout Already Volume, 1988

NAME OF THE AVEATION, May 1984

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### AIRPORT ≠ RESORT = NEW BUSINESS

Making private fixing taciffies as integral part of larger exercities. such as year-'reund country batal, can givere appreters a steador iscesse. Here's the case history at an air-recort that has survived the war and looks forward to expansion.

Fature growth of private fixing de-Estationy Mountains. Here is a



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AVIATION, May, 1946





A post-mand resort, hence for its food and mountability to harring and finding With Second has added prosent firing on a title, but as of inputest, edited. Earl for a few or a MTS fixing saless! Fifth Securi his helped days private flying when Manach was speci-

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ATIATION, May, 1946

#### Intercooling Problems in Airplane Design\* By HOLLEY B. DICKINSON

As R. vol. 12 No. 1 Con-

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## Review of Patents

By A. HARRY CROWELL Assessed father Language

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ATTATION, May, 1946





#### Greater warloads for the Mars

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thoug for greater surface mensurerability --Borb exclusive Curtus feorures





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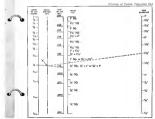
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eed Velves in the 1000 pound range for commercial

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#### Shank Size Calculations For Carbide-Tipped Tools

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TRU-LOC STRAP FITTINGS HAVE
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Streamshard may be the word to describe the advance rande by reduzing the proved WHAME STRAP STRAM, In fact, "expiring" the end that provide bearing the Bell-Type Bread Toronton due treingraing the appoint or "sport" each of the fitting have given streamberd appointment to the fitting Booston, the advantages on ready assert that the increasement is the strain.

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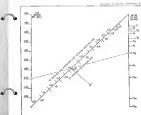
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#### Tip Size Calculations For Carbide-Tipped Tools

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PRECISELY INTERCHANGEABLE WITH AM SWAGED FITTINGS

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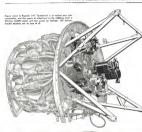
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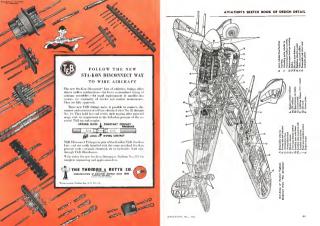
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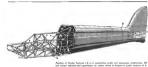




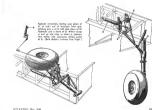


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Beined to its "up" position, the Gone Palley Guard extensionly moves the countembalt toward the bendstock, releases flat belt tenmon, and makes changing the belt position easy and sale . on exclusive patented Logan feeture. The flot belt tenning is comby oud quickly regulated by quittele server official-

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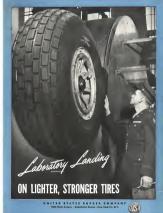
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#### Aviation Finance



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ADDING IT UP . . . . By RAY HDADLEY Man blies day. Alteralli officials have been pensionist Long term plausing. The Republic executive looks for a substantial sufficery market after the war fitnes of the sufficer life seasons at the record, been not been as

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third ingredient to 3-point landings



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ATTATION, May, 1944



Teytor sed White's great discovery wouth made possible high speed cuttling was the greatest simple development to help made mans production possible. The steel developed, commonly known as 18-41, served industry initially for over thirty years without a serious competite.

years without a serious competitor.

In the sayl 2020's the lint solyhderarn high speed steals were used on a substantial occuser-tial hosis seed, before the Second World War, about 20% of all taugsten high speed steals had already been neglated by roolyhderarn high speed steals on mostly. This steedy progress of logical steals on mostly. This steedy progress of logical

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TUBE TURNS Forgings for Industry





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How Products Editor AVIATION 330 W. 42+4 St., New AVIATION, May, 3844

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In your past-way planning, include these electric tools, Josses Clook Jr. Electric Company health is wide reage of once and





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AVEATION, May, 1846



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ATTATION, Mrg. 1844

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VIATION, Mrg. 1944



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AVIATION, May, 1946

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AVIATION, No., 1944

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Today, themseeds of Aeroprops are in nervor as those made more shown production here to take their places on new matters of Affiel fighters. That this has is an encounteally research it and productive combination.

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mathious will consider their leadership in the design and
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Additional References

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AVIATION, May, 1844

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#### Computing Airspeed

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form coefficient Samularly the chord force in get  $G_r = \frac{1}{r^2} \int_{-r}^{R} dq$  where dy in the vertical decomple chard force.

AVEATION, May, 1844

### WORTHY OF AMERICA'S FIGHTING SHIPS



### FIREPROOF NAUGAHYDE

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### U.S. NAUGAHYDE

Serving Through Science

United States Rubber Company



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GREENFIELD TAP & DIE CORP.

AVIATION, No. 2011

where M is the moment. Consistent with the convention of taking sainted moments should the quanter-shord point, the mapresion for the quarter-shord moment on-

 $C_{\text{out}} = \frac{1}{C_0} \left[ \int_{-T_0}^{T_0} \left( \frac{C}{4} - x \right) dx + \int_{-T_0}^{T_0} x dy \right]$ In classing the set state pressure if

of the level, and the meaning derivation of convenient reclification with which is personal to the first that have the survive of none containing Various written have internated different connectation with which is generated the data, however the build-internal of most are absoluted. If the five stream points preserve to take an other reference level, then the outside preserve to take an other reference level, then the outside preserve in the outside preserve in the contract personnel to mortify an other personnel to take the contract personnel to mortify an other personnel to the contract personnel to mortify an other personnel to the contract personnel to mortify an other personnel to the contract personnel t

where  $P_r$  is the local state oresone  $P_r$  in the loss servant state preserve. The deficient of the preserve conficient  $P_r$  is  $r = P_r = P_r = P_r$  (36)

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or  $P_s = H - \delta p$  (1) The value of H for the undoscribe stream is—  $H = P_s + \delta$  (1)

 $H = P_1 + t$  (18) Substituting this in the expression for  $p_1$  and solving —  $P_1 - p_2 = q - t p$  (26)

 $P = \frac{P_1 - P_2}{q_1} = 1 - \frac{M}{q_1} \qquad (33)$  In over reasons the data are presented in terms of the square of the velocity ratio  $-\left(\frac{V}{V_1}\right)^2$  which is called S. The Velocity between

From which  $P_1 + y_1 - y_2 + y_3$ from which  $P_1 - y_1 - y_2 - y_3$ Dividing by  $q_2$ 

Dividing by  $q_{\alpha}$  $(P_{\lambda} - P_{\lambda})/q_{\lambda} = 1 - \frac{p_{\lambda}}{q_{\lambda}} = 1 - \frac{P_{\lambda}}{p_{\lambda}}$ 

AVIATION, May, 1844



# Bridgehead UNDER FRIENDLY SKIES

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daily contribute to the morning headnes-unfallingly hasten the Victory. Leland aircraft designs now in the service, and others vet to he developed, will also serve peacetime aviation. Engineering of some models already in

progress. Engineering service available on call. THE LELAND ELECTRIC CO., DAYTON, OHI

Review of Patents

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DURING the past twelve years places have beencod faster - miles higher - many times further, Packeg this respressionted path of pragress were vital accessories such so the Young Alegraft Oil Coolers, shown shore. While the 1902 model was made by the hendreds - its modern counterpart is being made by the thousands, Through office in harde principle, the precent cooler to manadisc turies as home and has four those the heat transfer executive. It has resid resonant modities and excellent antheronoraling abanceteristies. The meetern Yearns Aire eraft Cooler to the fast word to efficiency . . . Is built to





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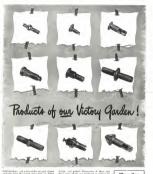
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with (Po) Built Hydraulic Diving and Landing Flap Cylinders Bernoth the pilot sent of Douglas dive bernisen - verill find a complicated extinder as

Destruction.

UNDER DEPENDANT COMPORT

semble that has a big responsibility. It's the A-P built bydrudic lending and diving flap ciliades, ingrescenty depasted to utilitisecond operation of both landing and diving flags to pull the beerber out of its screaming dire, or for more accurate landing,

Typical of A-P precision production methods on aircraft controls, this stundy cylinder is built for great strength, and to extrame tolerances. Tested at pressures of 4990 p.s.i. - twice the

persons required on the bomber's 2000 pound bederafic craten - it has met every requirement of the arms air foeces.

This is early ONE of many unconfined A-P Aircraft Controls now in service on all return of planes, in all theorem of war - bodesulic, caseine, oil and fiscal controls built to a single



2444 Such Thirp-lasted Street . Milewise



It's reprints buttons ... contractive either wines. Corp. Stane was done when orders come through to chosen ency to your production But the years in top fight woodworking that Sloone has This, compled with Slaver's present mastery of new technical weaklesse, mobbed us to set a record both in weadomen and our while our standards least to the came you next Show deritties are years for the soline Will Die to sit down and talk over your problems with you, WAJ: SLOANE

#### Contract Division

both level in obersa.

575 PIPTE AVENUE - NEW YORK 11 IATION, May, 1946

#### Because Snow is **OUT OF SIGHT**

## Don't Put it **OUT OF MIND!**



#### NOW is the time to Select Equipment for Next Winter's Snow Removal

Exercisment about rearteness was here that you can't get crew removal links a next aschage in early Spring and label it Important Advantages of

in the eff-course, when the past winter's experience can be stadied-specifies techniques re-examined-equipment checked -vited to winder ningert seasetten-most be evaluated, endowed and preduced months before the first snew falls. If a very land after too lote? to recognize the dangers of credways. But it's a lot outer to take chars NOW to leave readings

WALTER 250 H. P. SNOW RIGHTER

\* fees not works power in slapping, pinking or



WALTED MOTOR TRUCK CO. POD-15 (DVING ENT. BEDEFNOOR 27, OCCURS, L.L. N.Y.



Make Stronger Fastenings Faster...
Now we know, too, that they Cost Less to Use!"

Argune can see that American Philips
These servings creek both from
Sorows are the fargres and consent many.
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of assembly, as well as the most effect emerican and derive . . . and frees American

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Put the Screws on the Asis ... BUY WAR BONDS!



HOUDAILLE HERSHEY \* AN IMPORTANT NAME IN AVIATION

#### A little giant for a BIG job

 To control dangerous shimmying forces on the now wheels of lighters and bombers, the tail wheels of longecargo planes, is the job of the Houdsille-Hydraelle-Shimmy Damper. It is a relatively small, compact precision instrument, but it tames forces of great magnitudes. a little stant for a BIG isb, in fart.

magnitude—a little giant for a BIG job, in fact.

a The Hydraudia, Shimmay Damper is sely one of the production whith Breshell-Benshey in producing in quantity for the existing subsetty.

MANUFACTURERS OF PRECISION FARES AND EQUIPMENT FOR THE AUTOMOTIVE AUCEAFT . RAILWAY ... MANSIME . ELECTRIC PETRICIPERATION . . RADIO AND OTHER INDUSTRIES

AVIATION, May, 1844



To Save Lives On The Firing Line

Failure of a war plant to make ontime delitory of am part of the It is no convolence that when

water or other extraordisas recitors Why CARDOX Systems production schedules . . , protection

HOW CARDOX SYSTEMS PERFORM unit and applied at both rate-in gounds or some staidally reduces ony-

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Frevide Enhanced CO, Performance

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can be provided in small or large-

BELL BUILDING - CHICAGO 1, ILLIMOIS Sales Office is Now York - Beater - Multicaphra ter francis . Printery





VEEDER-ROOT

You not a clear, now-all picture of your production natiation restend of a parchy, heav "guesso mate" when Veeder Boos Devices are reporting right up to the minute on the performance

There we Vesder-Root Devices for mechanical and electrical made before couplie gets a footbald. Let Vender-Koot enganeers show you how Veeder-Boot Devices can help you make your

work cours for more. Weste,



Equipment of Stainless Steel, Nickel and Monel meets many specialized requirements others, a lettle Nodorl goes a long way

regrarees related the aid of Nobel,

It weekways the his of processing sp-Heere, standers and Nickel allows and counter eveders, for bugh prosonre

of the chemical industry... and of many

· Nickel · ATTANTON: Nov. 1044





America's leading air transport companies are typical customers for Reeves Army Twill. Whatever the industry, if uniforms are needed, this sop-quality fabric talkers smarch; and gives named across. Over 60 million yards of it have already been used to help comin America's facilting man, and it is proving itself under the

touchest climatic and combat conditions of alphal way. This fabric Sanforing! Shrunk® and color feet to sun, water and perspiration, will meet your post-way uniform needs. When the time corner to order them, choose from a wide range of parentar colors - Intist on certise Reeves Army Twill.

THE RELYS MARK ERDAP INCLUDES, Racers Acres Tools



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#### Putting Teeth in a 70-Ton Bite

TAKE SIX TONS of agbring farrwespitaround 2,000 horsepower -pall it seven miles up, at more than 600 m.p.h.--chet's just a rough idea of the work a propeller does on a Thursdorbole or similar emonanters fighter. There can be no margin for error in mamfactoring these "props" . . . Life and Victory ride

Successfully producing non-ferrous metal and soul "neve" blades to withstand a 70-ton pull at high speeds means farensively double-checking for ferious stresses which "pop" up ocensionally and eliminating this threat of failure before it actually happens in combut.

A McAloor psilored-to-the-ish prometers true composition and finishing method belped solve the problem. Not only were the occasionally microscopic fatigue stresses revealed, but the unbelievably smooth finish obtained, made it nosuble to feather the "pron" blades with neutrically no coefficient of air friction at bigh angula.

ready for this assignment. Long before the prosper of national peril, McAleer was busy belonce alectoft engine manufacturers obtain

a umiliar type fields on operating parts of the power plants that actually drive these peopellers. Pass YOUR bard-to-solve finishing production problems on to McAleer. Our broad experience in production finishing procedure and product improvement through finishing, can belp you materially in meeting your war pro-

Be the movernal, metal, plastic or wood-if the job can be finished better, faster, more econom-

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Field Degreer. As your profe place take dehase Land Transportation - the west concern under of your Santagering, Penduction and Sales Inscretions affin-The E-P Man can belp you to organise Meteral-Hanhim into your confidence as you make visal decisions dien frances to move your leads without water-in-Your local E-P Man is supported by Elevil-Purker's

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Elwell-Parker **POWER INDUSTRIAL TRUCKS** 



Here, ready for roughing, is a typical line-up of Goodyear-built Corsair fighter planes. They are facing terrific panishment in flights to test their stamina, speed, and maneuverability.

These Corsairs must prove they can take anything and do everything that are airmen will demand in battle, before their acceptance by the Navy.

For safe lubrication in the gruelling tests their builder, Goodycar Aircraft Corporation, relies on Sinclair Pennsylvania Aircraft Engine Oil.

## SINGUAIR AVIATION OTES



## Congratulations PCA

• In Ageil, 1922, "Mise Yozzentoven", a Waco-9, (opper right) was #2 plane in the three scenars free of Possophwaia Arkhoo-—user Pennsylvanis Gentisi Arkhoo-7Man Yozzentoven carried mail between Planlough and Cloveland, a dissaper of 127 mise Between most fights. What Yozzentown "carried people adel to supplement the company's scorne Eath people has

fired its operations.

In April, 1944, seventoes years later, Penaspleasia Central operators a large feet of
Danales DC.Ta. exercised with Visible on

gisse. It coveres reade of 3,200 eather serves 12 seates and 40 dities and exploys seasily 2,000 people During the past year, in Army service abuse. PCA planes flow 4,545,775 miles. On the occasion of its seventeenth birthday, PCA writes as that:

"80 Plane see the direct description of the

all of our connection object and ear pible and mediciness men say they're extremely dependable or all times." BG is presed of its contribution to PCA's extension record of public service and to its assuming record of safety—case of the fines in the industry.



THE BS CORPORATION

Contractors is the United Steen Army, Navy and Coast Guard and Astrony Engine Builders
AVIATION. Nov. 1844



paretively small and light pieces of equipment-Aerole for the nose shock absorbing unit built by the Cleveland Passmatic Tool Co. This bighty afficient leading over is antiqued with ESC Aircraft Newlie Bearings. The static non-Brigali comparity of these bearings has been found embrenily suitable for such orgitastices. withstanding haven about loads of short duration. This series of EBC Receives covers or wide course of uses which receive sings from 15" to 5" untile diameter.

Today, DeVilbus an-bundling and an-operated equip-Col Barrego

AVIATION, May, 2046

TRENTON . . . . NEW JERSEY

A Pioneer in Making Air Serve the Aviation Industry



#### far spraying materials fram hot lacquer to sound deadenes

But to DeVilbins, six is a seed to sid svirtion progress. tions. It is applying identifying symbols--doping wase. DeVilhies prosected in historials air for applying materials by the agree process more than \$6 years ago. cames of other marrials from group to coeffice compounds-and produced a complete line of equipment for compressing, clessing, regulating, converting and

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THE CRANK PIN BEARING MAIN REARINGS AND GIBS ON YOUR PHNCH PRESSES

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Crown engineers' field-experience in adopting Crawn Zippers to meet special military jobs will now his nostwar dividends to year!

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THE SPOOL COTTON COMPANY . Tell right Access, New York, N. Y. (Donn Endoor Discuss)





range of speed control for d-c motors from an a-c current departic braking for threed stopping-and reverses the meter. Many other functions are also coulble. There are no separate linestarters -- no field rhoustata. To get all the facts about this new perioaned easter drive, write today for your copy of bookist B-3301. Westinghouse Electric & Manufacturing Company, Best Pattsburch.





# of the Aviation Advertising Buyer

of Standard Rate and Date today, (In 1910 there were 9.)

They offer armintum remains from 2,000 to \$51,000. Their value new exentations are many and sorred-preating a perplaying challenge to those re-

to correct and post-ner surket apportunities may help clear the air, Each

Today the dividing lines between them are almost indistinguishable - so that current sales exportanties But after the war, this will change. Air transport and private flying will again become specialised marketing

Even as aviation suppliers concentrate on their first seh of wheeling the wor - they must let the groundwork -promenty the fixed base operatory and distributors

who will sell and service private places, distribute parts Functions of the Industry dastry - are not divisions but functions. They are electly intervoluted functions within each grasers and production two - are concerned not only

continued engineering abelifies and operation and maletreaser experience of the nighter and the married-

portant stake in the design and engineering of the plants he will sell and service.

and adsounts building of an emption advertising procount. They clearly forbasts the importance of a broadpayerage industry publication to not as the foundation

That is why Arreston in read by over 45,000 paid

Thus Aviation's murketing function is shortly defined

period of development in its Aistery, McGrass-JOE last

the marketing function of Artesian respectant

tenance was, but also engineers, designers and produc-

Embessed within Ariston's average yours of 115

For example - Aviation's Design

meet the mercaping demands of over and postmar, Steen its first more in 1606, Assation's editorial policy has been the serving of all the andustry's interlocking

The swift developments in avention today demand tion leaders and planners are the busest men in U.S. industry faday, and they must keep page with News in indicated by the fact that \$258 of the most

true publication within its first eight months. dir Transportfor apprialised construct of air termanetonics.

As ar transportation taken its place alongwide our other great carriers of passengers and easys, there has errors on argued seed for a publi-

the strong national votes of the industry. From the men who guide sial interests, he prespayment and chillien application - has came gamedlate recognition of the important editorial leadership of Aur Transport, To date 7764 of

We believe that these times management - Avoduse, Aviation News and Ave. Transport - after the most effective method of reaching the true houses inflyment of the quaties findustry - new and in the critical period about



STEATION, Mrs. 1846

## Finishing school

FOR PRECISION PILOTS

It's no mean chance that pilots form to fly with position on their Association mention. Under Sim raises can of that with advanced transcrible this Cosmo-Wingle AT-9 which is powered by two #EGST-cursped Lycometer co-

grees. On origine creat-shades, the one-piece sections of #EESP\* Cylindrical Robles Bearings provides case of this assembly and percities a charength frespection of all parts. When atomics learn the importance of #EESP\* performance for receiver the convenient of a date the continuous

more in training, they remember it after they graduate to the even-increasing remoter of fighters and bombon, that darken Asia skies



Answer to an Airline's Prayer... The Martin Mars Transport! In the 60-ton Mars improper, nostroy completely tooled and marmed by varied design, no harrily econerted delayery of commercial versions in toburber. Instead, they will have a suc- morrow's swing toward supremary of central type, thoroughly tusted in overthe skywnys. For miormation, write occup transportation. The 20 sister- Tenformy L Massor Co., Barranger-& Ma.

bulk by Lycoming Divisors—The Aviotion Corp. for AT-9's monafectured by Control Wicht Corp.



This is the most of a series of statements by eviation's leaders on THE SHAPE OF FLYING TO COME.

#### "Over 'the hump' to a better world!" new Core W. Esperary, Propellint of Carrier Bright Commercial

NAME THE ADDISE DEPOS ROAD, which our oir-O SEE THE ABILIA, BURN I MANN, I AND A CONY'S AND "Yet this is only 500 miles in a socal of \$110,000 soller of new gir reases that have been opened to Aprenou's 3,000,000 form and around creamen. "Faces like these street all sorts of notemals

There was very cause existing of bose the great promise of Amer-

Associate's and chromal mobbs. The narrard leaders of these elli-

ties for a better world and a permanent peace. robe its ariotion problems-problems of comersion and Assure, of air rights and ferrign policy, of government regulation and national accuracy.

"This 'branz' can be conquered only if those of with all atomake thinking, entirektoned Americans

This is the market eriocies thinks of other it thinks of the most than consilion Year, creditor femilianes

indetandly first to recept new chance for the better, Delivring that the ideas of substice's leaders are shown of interest to the eviation industry.



"We all have faith in those engines!"

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other bombers, figbrars, scaplages,

sca's armed forces depends spon

a share. And so Smolehoker workers



Studebaker bullos whight exclore engines

A die-cast part like this ds lightness to lightness

This walls, possible in Mado Magnesium the production have unequaled by our other process. Fecause the molien metal is known late does under bish recourse, well flick.

Note the brownes of detrol on that Marko Magnesium die custing. With but hitle mamarking empothly and accupately at high fabricating and machining costs frequently places magnerum die castings on a compet-Among the manuscript products going into our highting please are many the costings Their extreme kolytones, communitaria and deproduktikly are contributing to the adeancewent of sterrest design. They will do the same for you Our engineers will asked you in adapting

postwar products. Aluminum Company of Products, 1713 Gulf Belo., Pritsburgh 19, Pa.



CORPORATION SUSSIDIARY OF ALUMINUM COMPANY OF AMERICA

## Check your answer, YES or NO...



Year's head what the experies and prophens are asying about towards representing planes. And towards representing planes had likely as the second of the planes Right serve, at the sufficient planes, day and rights are heading planes, day and rights are heading planes, day and rights are heading about the second of the planes are asset and companies and the planes are as the ment and components. But with thinking about your post-over planes, too — and it's nome to early for you to do seen glunning. To get the view of fatomer are

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interesting and useful Aircraft

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Quiz. The Intelling-genr question

Theoramis are acting us for engine of this powercative postver Alexanti Quin. Shall we mad it in your Pix nearinged simply, so you see clock off the survers in a few infrasts. Then you can compare your answers with those of many other avittim retalizants who are now making their plans for powercine Sying. Jusgulas for powercine Sying. Juseral your many and address to me-you? receive the Aircraft Quin by return mail. . , Bellmen Morrit Commercion. Doot SA.

New Castle, Delaware,

American way of life and liberty.

Keep on Buying U. S. WAR BONDS

BELLANCA

Bush Intercooler

THE TAKE OFF. . .





Sorry that we have to encroach on your domain, bossie. But such is life. Thisgs have to make way for

progress and your favorite core nature, small though it is, will be as sie field for feeder line service one of these days. We're working on this idea here at Pletcher -- a plane that will carry a good pastorel. (convertible for passengers or cargo) at a reasonable speed, and that can get in and out of your cow pasture. If you know some folks that are inter-

ested, you might suggest that they drop us a line.

FLETCHER

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With the bias of nearly two million saw teeth per minute frictional to 56 Josh and non ferrous materials of greater thickness (rither formed or flat) with these exactions the festest, secenthral method monds in the majority of the country's leading apprecasaical plants and bandouts of other metal warders factories. Smooth, vitrationless and perfectly rate, these markings are designed specifically for high arend exerction by the principators of the high spord band saw. and embudy many natested features found in no other hand saw If you wont to sten un replaction and not costs, by all means write for belletis, "HIGH SPEED METAL CUTTING RAND SAWS."

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Made in 1/16",5/64" and 3/32" sizes also astellectory for DC operation.

DC weighing of light groups throuseregatraction. Made to a completely new formula, the Wilson No. 520.A.

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Ar Abelity to work at braker can-For complete details on the Wilson And that's get all! This electrode is

at the first the T When Biografs Fries List





This chart shows typical microstructures of wrought abanenous allors. Copys are available for your metallographer's use as a reference to ideaufrom these alloys. It will help him answer such

constitute as thereproted during fahryation? What also and charges real treatment? Boy complete are those charges? Chemical gnabous and mechanical tests are of invaluable aid to the metallurgist in descriptions the composition and mechanical measures of metals and allows. But those methods, whose or together, do not arreal the complete story. Metallography analysis bridges that any. The metallicarapher is able to delay sees the past history of a metal or alloy and narrow such questions as

This chart sictions appropriately of ellips. that have been currently treated. It will hade you establish secure positivenes searciers and in surful worde Ass. MINES COMPANY OF AMERICA, 2162 Guld Robbins, Patrikarch 29, Penny lyama.

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THE BOLE VALVE COMPANY

1850 1861 Correll Street, Olivare 12, 18140

## The screw that's Built like a Gear



A sweet engineering principle makes Brisco Multiple-Spling ommendation for protection

This server can be not un elabour than any other . . . for the spline design path the weenthing force infar beyond the point where an ocdioncy screw would be enter as bear

seg. Yet a fisch of the key will Any amorably man will theak at entire, faster, especially when the comparable size.

the splines in the screw cling to the



your product will be asserted for feven down to the No. 4 wire rise) a domeste norticorea more tightly, than other screws of

· concurring mochines a scientific instruments · new markings · electric refrigerators a mater nearthfus vocuum cleaners



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MUEHLHAUSEN Designed

SPRINGS

A field light is a relatively small part of an airport's equipment—but <u>not</u> small in importance.

Piston rings are relatively small, too. But <u>not</u> small in <u>importance</u> to aircraft engine manufacturers.



The world's finest piston rings are steaded equipment for these world-increas sirredt engines—Afisen - Wright - Fackard-built Balls-Supp - Franklin - Warner,

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Most the net of bridge-life field fitzers to consider name, of course, is Populator, Not the smallest particles can also through its repression. When fape, landing gene, bomb buy doors are miss

Small in size. Bake in wright, it operates under all weather conditions. Its fearing area also makes highly efficient air filters for vacuum sor's Avission Comboe Parolette Products, Inc.,

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tion — SimplifyIng lodification and Repair Service

1 prill ONE Hole

2 Jones LOK-SKRU

3 Riveted securely by drawing sleeve against laner side of metal with special nower or hand tool

A Attachment festened by serow larked in anchar aut.



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#### Off Comes the Lid of Aircooled Engine Power

merely shough on the extender burnel. The inefficiency of

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lution has been found. This produtionary development.

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The expressions of "Leader" to the 3-45 lets the

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DU PONT

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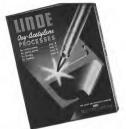




# that challenges future effort

Promine are just preceives unless kept; but senat of our Army-Navy "E" swart it on presses Uncle Sam's recognition of our esttribution to the nation's production record mark, new "E" is not make a symbol of a whalsab well done but an inspiring challenge to trols for America's peeds, Today, torrecrow and setd "V" Day, we will continue to earn





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pieces of equipment and dry them out as best we could. Which we did, And never thicken they'd be any mod again, we tried to worked. But if you think that was a surgerer, how do you think I ... Hopekta Portable Generators, made in my home term





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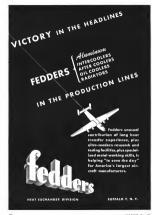
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